Managing Community-Acquired Pneumonia and Aspiration Pneumonia in Adults

last modified June 2025

The chart below is based on the 2019 guideline for the management of community-acquired pneumonia in adults from the American Thoracic Society (ATS)/Infectious Diseases Society of America (IDSA).[1] Antibiotic dosing is provided for **adults**. The second chart below provides answers to common questions about aspiration pneumonia.

Community-Acquired Pneumonia Treatment Basics
• The **need for hospitalization** should be based on clinical judgment plus results of a validated prognostic tool.[1] Use of the PSI is recommended over CURB-65.[1] PSI is better than the CURB-65 at identifying patients who can safely be treated as outpatients, but CURB-65 is easier to use.[1] PSI may underestimate severity in younger patients.[1] The PSI is available at https://www.mdcalc.com/psi-port-score-pneumonia-severity-index-cap and the CURB-65 is available at https://www.mdcalc.com/curb-65-score-pneumonia-severity.
• Patients with **severe pneumonia** are typically those requiring intensive/critical care. See **footnote b** for guideline criteria for severe pneumonia.
• Patients with CAP should be treated with antibiotics **for at least five days** (**seven days** for MRSA or *Pseudomonas*).[1] Antibiotics should not be stopped **until the patient is clinically stable**.[1] This means abnormalities in vitals (heart rate, blood pressure, respiratory rate, oxygen saturation, body temperature) and cognition have resolved, and the patient is eating.[1]
• The most common **bacterial causes** of community-acquired pneumonia in outpatients are *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Mycoplasma pneumoniae*, *Staphylococcus aureus*, *Legionella* species, *Chlamydia pneumoniae*, and *Moraxella catarrhalis*.[1]
• It is suggested that anaerobic coverage not be routinely added in cases of **aspiration pneumonia** unless lung abscess or empyema is suspected.[1] Our chart below covering aspiration pneumonia has more considerations.
• **Blood culture** yield is low in patients with nonsevere CAP.[1] Blood cultures are not recommended in outpatients, and it is suggested that they not be routinely done in the hospital setting in nonsevere CAP.[1] Blood cultures are recommended in severe CAP, and in patients being treated empirically for, or previously infected with, *Pseudomonas aeruginosa* or MRSA, or who had been hospitalized and received parenteral antibiotics within the prior 90 days.[1]
• **Sputum gram stain and culture** is recommended in severe CAP, in patients being treated empirically for, or previously infected with, *Pseudomonas aeruginosa* or MRSA, and perhaps in those hospitalized and treated with antibiotics within the prior 90 days.[1] Collection of lower respiratory tract secretions for *Legionella* culture or nucleic acid amplification testing is suggested in severe CAP.[1]
• **Urine antigen testing** for *Pneumococcus* and *Legionella* is suggested in severe CAP.[1] *Legionella* testing is also suggested if epidemiology indicates exposure (e.g., travel or overnight stay in a healthcare facility in the previous 14 days; outbreak).[1,2]
• If **influenza** is circulating in the community, testing with a rapid molecular assay (preferred over an antigen test) is suggested.[1] Coverage for influenza is suggested for outpatients who test positive, and is recommended for inpatients who test positive.[1]
• **Procalcitonin** is not recommended to determine need for initial, empiric antibiotic treatment (**see footnote g**).[1]
• Guidelines suggest not using **corticosteroids routinely** for severe CAP.[1] See **footnote f** for newer data and situations where they might be considered.

Patient Characteristics (see footnote a)	**Outpatient Oral Antibiotic Regimen (see footnote a)**

Previously healthy without comorbidities (see below) and without risk factors for *Pseudomonas aeruginosa* or MRSA (e.g., prior respiratory isolation of MRSA or *Pseudomonas aeruginosa*, or hospitalization and receipt of parenteral antibiotics within the 90 days prior. See **footnote d** for additional risk factors).	• Amoxicillin 1 g TID (high dose targets resistant *Streptococcus pneumoniae*[3])
	OR
	• Macrolide (if local pneumococcal resistance is <25% [resistance is >30% in most of US])
	  • Azithromycin 500 mg x 1, then 250 mg once daily, or
	  • Clarithromycin 500 mg BID or 1,000 mg once daily (extended-release)
	OR
	• Doxycycline 100 mg BID (less data) (consider a loading dose of 200 mg)
	
	Note: patients with risk factors for MRSA or *Pseudomonas* are not commonly managed as outpatients, but if they are, they will need coverage for these pathogens as well.

With comorbidities:
• Heart disease
• Lung disease
• Liver disease
• Kidney disease
• Diabetes
• Alcoholism
• Cancer
• Asplenia
 	
Regimens for patients with comorbidities target resistant *Streptococcus pneumoniae*, atypicals, beta-lactamase-producing *Haemophilus influenzae* and *Moraxella catarrhalis*, enteric gram negatives, and methicillin-susceptible *Staphylococcus aureus*.
	Beta-lactam
	• Amoxicillin/clavulanate (500 mg/125 mg TID or 875 mg/125 mg BID, 2,000 mg/125 mg BID)
	OR
	• Cephalosporin (cefpodoxime 200 mg BID or cefuroxime axetil 500 mg BID)
	PLUS
	Macrolide
	  • Azithromycin 500 mg x 1, then 250 mg once daily, or
	  • Clarithromycin 500 mg BID or 1,000 mg once daily (extended-release)
	OR
	Doxycycline 100 mg BID (less data) (consider a loading dose of 200 mg)
	
	OR
	
	Monotherapy with a respiratory quinolone: levofloxacin 750 mg once daily, moxifloxacin 400 mg once daily, gemifloxacin 320 mg once daily (US), delafloxacin 450 mg orally every 12 h[5] (US; new indication post-guideline publication[5]). Consider adverse effects.
	
	Note: patients with risk factors for MRSA or Pseudomonas are not commonly managed as outpatients, but if they are, they will need coverage for these pathogens as well.

a. If the patient has recently received (i.e., within the past 90 days) an antibiotic, pick an option from a different class.[1,3] Dosing is for oral tablets/capsules for **adults** with normal kidney/liver function. Based on ATS/IDSA guideline unless otherwise referenced. Information may differ from product labeling. Most antibiotics available generically, at lower cost. Brand only available for gemifloxacin (*Factive*, US).

Patient Characteristics (see footnote c)	Inpatient Antibiotic Regimen (see footnote c)
Nonsevere pneumonia without risk factors for Pseudomonas aeruginosa or MRSA (e.g., prior respiratory isolation of MRSA or Pseudomonas aeruginosa, or hospitalization and receipt of parenteral antibiotics within the 90 days prior. **See footnote d** for additional risk factors.)	**Beta-lactam** • Ampicillin/sulbactam (1.5 to 3 g every 6 h) OR • Cephalosporin (cefotaxime 1 to 2 g every 8 h, ceftriaxone 1 to 2 g once daily, or ceftaroline 600 mg every 12 h [US], or possibly ceftobiprole 667 mg every 8 h [US][19]). **PLUS** **Macrolide** • Azithromycin 500 mg once daily, or • Clarithromycin 500 mg BID OR **Doxycycline** 100 mg BID (less data) **OR** **Monotherapy with a respiratory quinolone**: levofloxacin 750 mg once daily, moxifloxacin 400 mg once daily, or delafloxacin 300 mg IV every 12 h[5] (US; new indication post-guideline publication[5]). Evidence favors beta-lactam/macrolide combination. Consider adverse effects.
Severe pneumonia without risk factors for Pseudomonas aeruginosa or MRSA (e.g., prior respiratory isolation of MRSA or Pseudomonas aeruginosa, or hospitalization and receipt of parenteral antibiotics within the 90 days prior. **See footnote d** for additional risk factors.)	Beta-lactam plus a macrolide, or a beta-lactam plus a respiratory quinolone. Dosing as above. Use of HCAP criteria (e.g., nursing home residence, recent hospitalization) should no longer be used to broaden coverage for resistant organisms (e.g., MRSA, resistant gram negatives), and use of this term is no longer recommended.[1,4]
Prior respiratory isolation of MRSA, or hospitalization and parenteral antibiotics within 90 days prior and locally validated risk factors for MRSA. **See footnote d** for additional risk factors. MRSA coverage generally not needed if nasal swab is negative, especially for nonsevere CAP. If positive, cover pending culture results.	**Prior respiratory MRSA isolation: add** MRSA coverage* to above inpatient regimen and use cultures/nasal PCR to guide need for continuation/discontinuation of MRSA coverage. **Recent hospitalization and parenteral antibiotics and locally validated risk factors for MRSA (see footnote e)** • **Severe** pneumonia: **add** MRSA coverage* to above inpatient regimen and use cultures/nasal PCR to guide need for continuation/discontinuation of MRSA coverage. • **Nonsevere: add** MRSA coverage* to above inpatient regimen only if cultures or PCR are positive. ***MRSA coverage** = linezolid 600 mg BID, or vancomycin 15 mg/kg every 12 h with dose adjusted per levels.

Patient Characteristics (see footnote c)	Inpatient Antibiotic Regimen (see footnote c)
Prior respiratory isolation of Pseudomonas aeruginosa, or hospitalization and parenteral antibiotics within 90 days prior and locally validated risk factors for Pseudomonas aeruginosa. **See footnote d** for additional risk factors to consider.	**Prior respiratory Pseudomonas aeruginosa isolation**: change beta-lactam in above inpatient regimen to one with pseudomonal coverage,** and use cultures/nasal PCR to guide need for continuation/discontinuation of pseudomonal coverage. **Recent hospitalization and parenteral antibiotics and locally validated risk factors for Pseudomonas aeruginosa** (see footnote e) • **Severe** pneumonia: change beta-lactam in above inpatient regimen to one with pseudomonal coverage** and use culture to guide need for continuation/discontinuation of pseudomonal coverage. • **Nonsevere**: change beta-lactam in above inpatient regimen to one with pseudomonal coverage** only if culture-positive. ****Pseudomonal coverage** = piperacillin/tazobactam 4.5 g every 6 h, cefepime 2 g every 8 h, ceftazidime 2 g every 8 h, imipenem 500 mg every 6 h, meropenem 1 g every 8 h, aztreonam 2 g every 8 h

b. ATS/IDSA guideline criteria for **severe pneumonia**: septic shock with need for vasopressors, respiratory failure requiring mechanical ventilation, or three or more minor criteria: respiratory rate ≥30 breaths/min., PaO2/FiO2 ratio ≤250, multilobar infiltrates, confusion or disorientation, BUN ≥20 mg/dL, white blood cell count <4,000 cells/mm^3 (not due to chemo), platelets <100,000/mm^3, core temperature <36°C, hypotension requiring aggressive fluid resuscitation.[1]

c. If the patient has recently received (i.e., within the past 90 days) an antibiotic, pick an option from a different class.[1,3] Dosing is for adults with normal kidney/liver function. Based on ATS/IDSA guideline unless otherwise referenced. Information may differ from product labeling. Most antibiotics available generically, at lower cost. Brand only available for ceftaroline (*Teflaro* [US]) and ceftobiprole (*Zevtera* [US]).

d. **Examples of additional risk factors to consider:** COPD with bronchiectasis, chronic kidney disease, antibiotic use within the past 30 to 60 days, tube feeding, nursing home residence.[7,11] Nursing home residence is not consistently a risk factor.[7]

e. **"Local validation"** means using local data to determine the prevalence of MRSA and *Pseudomonas* patients with CAP and identifying risk factors for infection locally (e.g., at your local hospital). If local data are unavailable and empiric coverage for MRSA or *Pseudomonas* is instituted on the basis of published risk factors (e.g., footnote d), continue or deescalate the regimen based on culture results.[1]

f. Role of **corticosteroids**. Corticosteroids can be considered in refractory septic shock, patients on high-flow supplemental oxygen, a pneumonia severity score over 130, and for steroid-responsive comorbidities (e.g., COPD, asthma, autoimmune disease, etc).[1,12] Corticosteroids may reduce mortality in severe CAP (NNT = 18), although mortality benefit is not consistent across studies.[1,8] Another, larger study showed reduction in mortality with early initiation of hydrocortisone in one in 17 ICU patients (N = 795).[12] Corticosteroids may reduce time to clinical stability and length of stay by about one day, and reduce the need for mechanical ventilation.[6,9] More study is needed to identify which subgroups benefit the most (e.g., patients with high inflammatory response).[10] Consider corticosteroids for patients who are clinically unstable or not responding to treatment, and perhaps those with elevated markers of inflammation (e.g., C-reactive protein).[6,9,10]

g. Empiric antibiotics should be started if CAP is clinically suspected and radiographically confirmed, regardless of **procalcitonin** level; new evidence suggests that sensitivity is inadequate to determine when initial antibiotic therapy can be safely deferred in this setting.[1]

Aspiration Pneumonia	
Question	**Answer/Pertinent Information**
What is aspiration pneumonia?	• Aspiration pneumonia is a lung infection caused by large-volume inhalation of pathologically-colonized oropharyngeal or upper GI secretions. Think of aspiration pneumonia as part of the pneumonia spectrum including community-acquired pneumonia, and hospital-acquired pneumonia, rather than its own entity.[13] • Microaspiration (small-volume aspiration) of oropharyngeal secretions is normal, especially during sleep. However, microaspiration is involved in the pathogenesis of most pneumonias.[13] • Aspiration pneumonia is DIFFERENT from chemical pneumonitis from aspiration.[13] o Chemical pneumonitis from aspiration leads to **inflammation** due to aspiration of irritating acidic gastric contents.[13] This inflammation can lead to a sudden onset (almost immediate) of symptoms that can easily be confused with pneumonia (e.g., fever, cough, elevated white blood cell count, wheezing, tachycardia).[13,14] Chemical pneumonitis can also appear like acute respiratory distress syndrome (ARDS) with bronchospasms and frothy sputum with bilateral patchy infiltrates on chest x-ray.[15] o Aspiration pneumonia is a **secondary infection** that develops over a few days due to the combination of aspirated microorganisms and damaged lung tissue.[13,14] Infiltrates on chest x-ray may not be seen early in cases of pneumonia.[13] • Aspiration pneumonia is linked to a higher mortality rate (29.4%) compared to community-acquired pneumonia (11.6%).[13]
What are **risk factors** for aspiration pneumonia?	• Patients with multiple risk factors for large-volume aspiration are at increased risk for aspiration pneumonia and death.[13] These risk factors include:[13,15,16] o alcohol use o poor dentition (increases bacterial load, not necessarily risk of aspiration) o dysphagia and gastroesophageal reflux o head, neck, and esophageal cancer o esophageal strictures o chronic obstructive pulmonary disease (COPD) o seizures o degenerative neurologic disease (e.g., multiple sclerosis, Parkinson's disease; dementia) o impaired consciousness o enteral feeding (especially if associated with impaired gastric motility, poor cough reflex, and altered mental status)
How do **chest x-rays** help diagnose aspiration pneumonia?	• Aspiration pneumonia is difficult to diagnose and differentiate from other aspiration syndromes, community-acquired pneumonia, and hospital-acquired pneumonia.[13] • Chest x-rays, along with clinical history, are used to diagnose aspiration pneumonia.[13] • Infiltrates on chest x-ray seen in gravity-dependent locations can be a clue that a patient with pneumonia has an aspiration pneumonia.[13]

Aspiration Pneumonia	
Question	**Answer/Pertinent Information**
	○ Aspiration from a supine position leads to infiltrates in the superior lower lobe or posterior upper lobes.[13] ○ Aspiration from an upright position leads to infiltrates in the basal segments of the lower lobes.[13]
What role do **proton pump inhibitors** play in aspiration pneumonia?	• PPIs reduce gastric acid and have the potential to promote an environment more favorable for bacterial growth in secretions that may be aspirated.[15] • It is not known if PPIs increase the risk of aspiration pneumonia. However, PPIs seem to **reduce** the risk of chemical pneumonitis.[13,15] • See our chart, *Proton Pump Inhibitors: Appropriate Use and Safety Concerns*, for how PPIs impact pneumonias.
What **microorganisms** are typically responsible for aspiration pneumonia?	• The bacteria most often involved in aspiration pneumonia appear to be similar to the bacteria involved in non-aspiration pneumonias.[13] ○ Bacteria associated with **community-acquired cases of aspiration pneumonia** are commonly *Streptococcus pneumoniae*, *Staphylococcus aureus*, *Haemophilus influenzae*, and Enterobacteriaceae.[13] ○ Bacteria associated with **hospital-acquired cases of aspiration pneumonia** are commonly gram-negative organisms, including *Pseudomonas aeruginosa*.[13] • It was previously thought (i.e., in the 1970s) that anaerobes (alone or in combination with aerobes) were involved in a large number of cases of aspiration pneumonia (45% to 48%).[13,14,17] Common anaerobes include *Bacteroides*, *Peptostreptococcus*, *Porphyromonas*, *Prevotella melaninogenica*, and *Fusobacterium* species.[15]
When should therapy be **started** after aspiration?	• Follow hospital protocols for when to initiate antibiotics with suspected pneumonias. • If it is not clear if a patient has chemical pneumonitis versus aspiration pneumonia after an acute episode of aspiration:[13] ○ Can consider waiting about 48 hours before starting antibiotics in patients who display mild to moderate symptoms if the chest x-ray is clear. ○ Can consider empirically starting antibiotics in patients with severe symptoms. Re-evaluate the need for continued antibiotics in two to three days based on clinical course and chest x-ray.

Aspiration Pneumonia	
Question	**Answer/Pertinent Information**
Which **antibiotics** are most appropriate for suspected aspiration pneumonia?	• Choice of antibiotics will depend on where the pneumonia developed (e.g., community, hospital, long-term care facility), risk factors for resistant infections, and the likelihood that anaerobes are involved.[13] • There are limited data to guide anaerobic coverage when treating pneumonia.[17] Avoid empirically covering for anaerobes in most patients with suspected aspiration pneumonia (including pneumonia patients with aspiration risks) as they may not improve clinical outcomes.[13,17] Instead, choose antibiotics based on hospital protocols for CAP, HAP, and VAP. Consider initially covering for anaerobes in patients with: o risk factors for aspiration AND highest risk for an anaerobic infection (e.g., severe gum disease or poor dentition).[13] o foul smelling sputum or drainage from an abscess or empyema.[17] **Antibiotic Selection** • Most beta-lactam/beta-lactamase inhibitor combos (e.g., piperacillin/tazobactam), carbapenems, and some fluoroquinolones (e.g., moxifloxacin), already cover many anaerobes.[13,15,18,19] (Note ceftazidime/avibactam and levofloxacin, a common formulary fluoroquinolone, should not be used for anaerobic coverage.) In addition, antibiotics used to treat CAP, HAP, or VAP can be changed to an antibiotic that covers typical CAP pathogens and anaerobes. For example, beta-lactams can be changed to ampicillin/sulbactam or amoxicillin/clavulanate.[19] • Note that data using metronidazole to treat pneumonias are very limited. However, if adding specific anaerobic coverage to existing therapy, consider metronidazole over clindamycin. **Metronidazole** has good oral bioavailability (>90%), covers anaerobes from both "**above and below the belt,**" and has a lower risk of *C. difficile* infections compared to clindamycin.[20] **Clindamycin** also has good oral bioavailability (~90%), has a higher risk of *C. difficile* infections, and only covers gram-positive organisms and anaerobes from "above the belt."[21] o If using metronidazole, be sure to combine with a beta-lactam. Metronidazole lacks coverage of organisms commonly associated with pneumonia, such as gram-positive bacteria (e.g., *S. pneumoniae*).[16,19] • Can consider a **fluoroquinolone** (e.g., moxifloxacin [covers anaerobes], levofloxacin plus metronidazole if covering for anaerobes), in patients with a severe penicillin allergy. Also, see our chart, *Managing Beta-Lactam Allergies*, when considering a beta-lactam in a patient who reports a penicillin allergy. **Assessment and Follow-up** • Promote antibiotic stewardship and adjust antibiotic therapy based on culture and sensitivity results. o Sputum cultures are easy to get (noninvasive) and inexpensive, but are often inconclusive. However, they can be used to guide therapy when organisms are able to be identified.[14] • In addition, follow hospital protocols to convert patients to oral therapy once stable, clinically improving, and able to take things by mouth. For example, patients on an intravenous beta-lactam (e.g., ampicillin/sulbactam) can usually be converted to oral amoxicillin/clavulanate.[22]

Aspiration Pneumonia	
Question	**Answer/Pertinent Information**
How long should patients with aspiration pneumonia be treated?	• Treat most patients with aspiration pneumonia like you would for CAP (at least five days) or HAP and VAP (seven days total) [Evidence Level C].[3,13,23] Can consider longer durations of treatment for patients:[13] o who are not responding well to antibiotic therapy. o with necrotizing pneumonia (destruction of the underlying lung tissue, leading to multiple small, thin-walled cavities). o with lung abscesses. o with empyema (a collection of pus in the pleural cavity). • Expect patients with an abscess or empyema to require drainage in addition to antibiotic therapy.[13]
What **prevention strategies** can be used?	• Use the following to minimize post-operative chemical pneumonitis:[13] o Ensure patients fast for at least EIGHT hours, and avoid clear liquids for at least two hours, prior to surgery. o If possible, avoid using medications that increase risk of aspiration or interfere with swallowing (e.g., sedatives, antipsychotics). • Though data are not conclusive, can consider promoting oral intake with a mechanical soft diet with thickened liquids over pureed foods to reduce the risk of aspiration pneumonia in patients with dysphagia.[13,15] • When enteral feedings are needed, ensure patients are semirecumbent, not supine to reduce the risk of gastric aspiration.[13] • Follow hospital protocols for elevating the head of the bed in ventilated patients, to reduce the risk of aspiration.[15] • For patients with swallowing disorders, promote nutritional rehab with swallowing exercises and early mobilization.[13] • The data are weak to support oral hygiene in preventing aspiration pneumonia, but these efforts are unlikely to lead to harm.[13,15] Promote good oral hygiene (e.g., tooth brushing, cleaning dentures, gargling disinfectant solution, extraction of nonviable teeth).[15,16]

Abbreviations: BID = twice daily; BUN = blood urea nitrogen; CAP = community-acquired pneumonia; COPD = chronic obstructive pulmonary disease; GI = gastrointestinal; h = hour or hours; HAP = hospital-acquired pneumonia; HCAP = healthcare-associated pneumonia; ICU = intensive care unit; MRSA = methicillin-resistant *Staphylococcus aureus*; PaO2/FiO2 = arterial oxygen partial pressure/fractional inspired oxygen; PCR = polymerase chain reaction; PPI = proton pump inhibitor; PSI = pneumonia severity index; TID = three times daily; VAP = ventilator-associated pneumonia.

Users of this resource are cautioned to use their own professional judgment and consult any other necessary or appropriate sources prior to making clinical judgments based on the content of this document. Our editors have researched the information with input from experts, government agencies, and national organizations. Information and internet links in this article were current as of the date of publication.

Levels of Evidence

In accordance with our goal of providing Evidence-Based information, we are citing the **LEVEL OF EVIDENCE** for the clinical recommendations we publish.

Level	Definition	Study Quality
A	Good-quality patient-oriented evidence.*	1. High-quality randomized controlled trial (RCT) 2. Systematic review (SR)/Meta-analysis of RCTs with consistent findings 3. All-or-none study
B	Inconsistent or limited-quality patient-oriented evidence.*	1. Lower-quality RCT 2. SR/Meta-analysis with low-quality clinical trials or of studies with inconsistent findings 3. Cohort study 4. Case control study
C	Consensus; usual practice; expert opinion; disease-oriented evidence (e.g., physiologic or surrogate endpoints); case series for studies of diagnosis, treatment, prevention, or screening.	

***Outcomes that matter to patients** (e.g., morbidity, mortality, symptom improvement, quality of life).

[Adapted from Ebell MH, Siwek J, Weiss BD, et al. Strength of recommendation taxonomy (SORT): a patient-centered approach to grading evidence in the medical literature. Am Fam Physician. 2004 Feb 1;69(3):548-56.
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